Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

DESIGN AND TECHNOLOGY HIGHER LEVEL 8340/1

PAPER 1 2 hours

Marks 100 **2017**

Additional Materials A3 drawing paper for Question 11 only
Non-programmable calculator
Standard drawing equipment

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page and on all separate answer sheets used.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.
- You may use a non-programmable calculator.
- The number of marks is given in brackets [ ] at the end of each question or part question.

Part A

- Answer **all** questions.
- Write your answers in the spaces provided on the Question Paper.
- You should spend about 30 minutes on **Part A**.

Part B

- Answer **one** question.
- **Question 11** should be answered on the separate A3 drawing paper.
- At the end of the examination fasten your A3 work to this Question Paper.
- **Questions 12** and **13** should be answered in the spaces provided on the Question Paper.

For Examiner's Use	
Part A	
Part B 11	.....
12	.....
13	.....
TOTAL	

Marker	
Checker	

This document consists of **26** printed pages and **2** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

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For Examiner's Use

Part A

Answer **all** questions from **Part A** in the spaces provided.

1 Fig. 1 shows the rear end of a bicycle.

Fig. 1

(a) Identify the object at the rear end of the bicycle that will draw the motorist's attention to the bicycle on the road.

..... [1]

(b) Name the colour of the object that shows the motorist that there is a bicycle on the road.

..... [1]

(c) Give a reason why this colour is used.

.....

.....

..... [2]

2 Explain and give an example to indicate why the following factors should be considered before a decision is made on the type of material for a product.

(a) Manufacturing process

.....

.....

.....

..... [2]

(b) Properties

.....

.....

.....

..... [2]

3 Fig. 2 shows a slide made out of mild steel and plastic.

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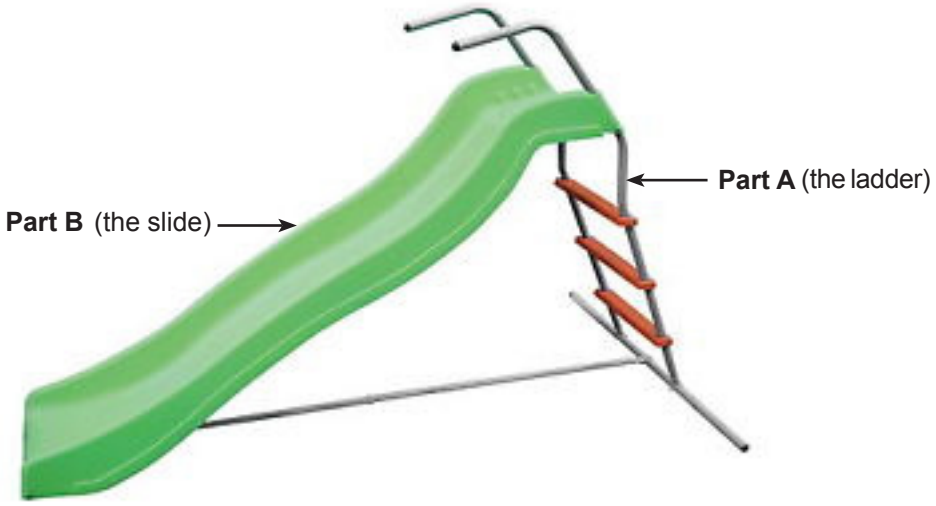

Fig. 2

(a) Use sketches and notes to show how the safety of **Part A** (the ladder) could be improved.

[2]

(b) **Part B** (the slide) is made of plastic that is not resistant to Ultra Violet (UV) rays from the sun and tends to become brittle after some time.

Suggest a non-ferrous metal or alloy that could be used to replace **Part B**. Provide a suitable reason for your choice of metal or alloy.

Metal/alloy.....

Reason.....

.....

..... [2]

4 Fig. 3 shows a wooden fruit bowl which could be used for decorative purposes on any garden or dinner table.

Fig. 3

(a) Name the equipment that could be used to make the bowl in Fig. 3.

..... [1]

(b) Oiling was applied to bring out the natural beauty of the wood and to seal it. Briefly outline the procedure of applying oil as a finishing method.

.....

.....

.....

.....

.....

..... [3]

5 Fig. 4 shows a garden bench.

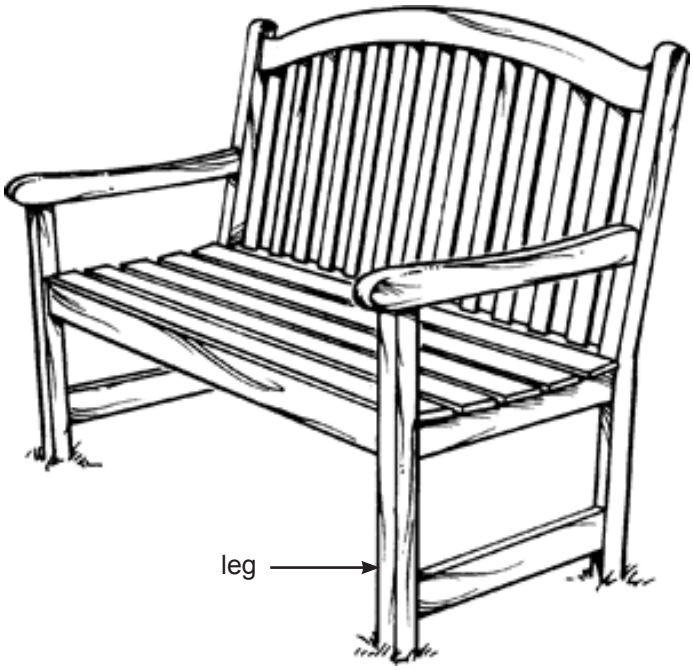

Fig. 4

(a) Evaluate the garden bench in Fig. 4 regarding the functionality and safety.

Functionality.....

..... [1]

Safety.....

..... [1]

(b) The bench may be unstable in use. Add sketches and notes to Fig. 4 to show a method of stabilising the legs. [4]

6 Fig. 5 shows a watering can that is manufactured from High Density Polythene.

Fig. 5

(a) Give **two** possible negative impacts on the environment caused by the manufacture and disposal of the watering can in Fig. 5.

1 .....

.....

2 .....

..... [2]

(b) Give **two** reasons why the designer decided to develop the watering can in this particular shape.

1 .....

.....

2 .....

..... [2]

7 Fig. 6 shows a "bar" stool made out of hardwood.

Fig. 6

(a) Consider the shape of the seat and the height of the stool. State if the design fits the purpose and is successful.

.....

.....

..... [2]

(b) (i) Suggest a change in shape of the seat to improve comfort.

.....

..... [1]

(ii) Suggest a change in the size of the stool to improve ergonomics.

.....

..... [1]

8 Fig. 7 shows a plastic chair.

Fig. 7

Explain the anthropometric data that was considered in the design of the chair shown in Fig. 7.

.....

.....

.....

..... [2]

For Examiner's Use

9 Fig. 8 shows two types of energy provider.

A **B**

Fig. 8

(a) Identify the primary source of energy for provider **A** and **B**.

A .....

B ..... [2]

(b) Give **one** main difference between the primary sources of energy for **A** and **B**.

.....

.....

.....

.....

.....

..... [2]

10 Fig. 9 shows a wind pump that pumps water into a small dam.

For Examiner's Use

Fig. 9

(a) Complete the following system block diagram.

INPUT	PROCESS	OUTPUT
		water running into dam

[2]

(b) State if the system is an open or a closed loop system. Give a reason for your answer.

.....

.....

.....

..... [2]

[40]

Part B

Answer **one** question from **Part B**.

11 Design Communication (pages 10 to 13 of this booklet)

Answer the whole of this question on separate A3 drawing paper.

Mr Ndjiku has built a new house and needs to install a sliding gate and some other articles in the garden to complete the project.

Fig. 10 shows the exploded view of the sliding gate wheel.

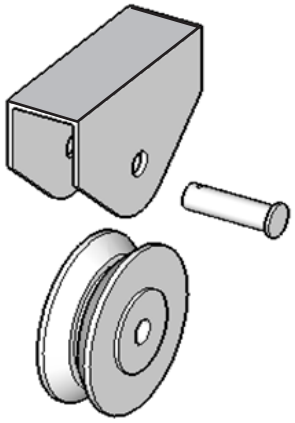

Fig. 10

Fig. 11 shows front and left view drawings with measurements of the parts of the sliding gate wheel .

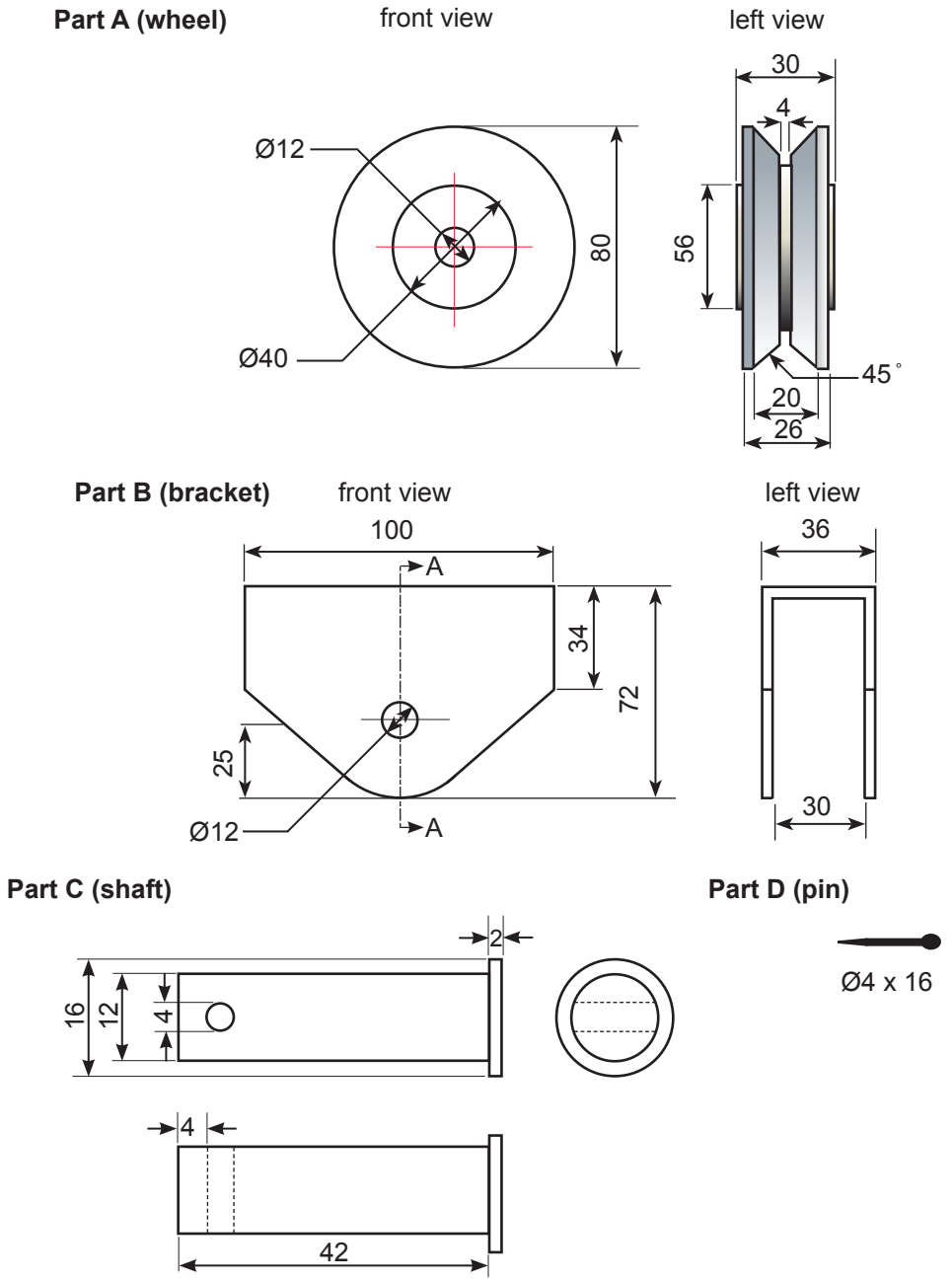

Fig. 11

Use the information in Fig. 11 to draw assembled views of the following in first angle orthographic projection to **scale 1:1**.

(a) (i) The front view of the assembled wheel **(Part A)**, bracket **(Part B)**, shaft **(Part C)** and pin **(Part D)** shown in Fig. 11. All hidden detail must be shown. [10]

(ii) The sectional left view of the wheel assembly. See the sectional line **A-A** as indicated in the front view of **Part B** in Fig.11. [10]

(iii) The top view of the wheel assembly. Show all hidden detail. [10]

(iv) Insert **five** dimensions in the front view. [5]

(v) Write the following label underneath the views mentioned on the previous page in the appropriate font and to be 10 mm high. [3]

GATE WHEEL – SCALE 1:1

(b) Make a free hand isometric drawing of **Part C**, the shaft shown in Fig. 11 to be twice the original size. [10]

(c) Fig. 12 shows a flower pot made from hardwood to be used in the garden.

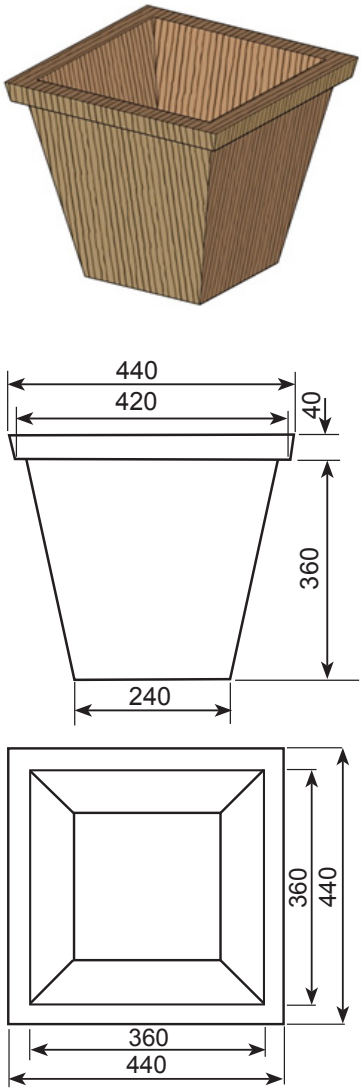

Fig. 12

Draw to a **scale 1:10**, a **two point perspective** of the flower pot.

The layout for the drawing is given in Fig. 13. No hidden detail has to be shown.

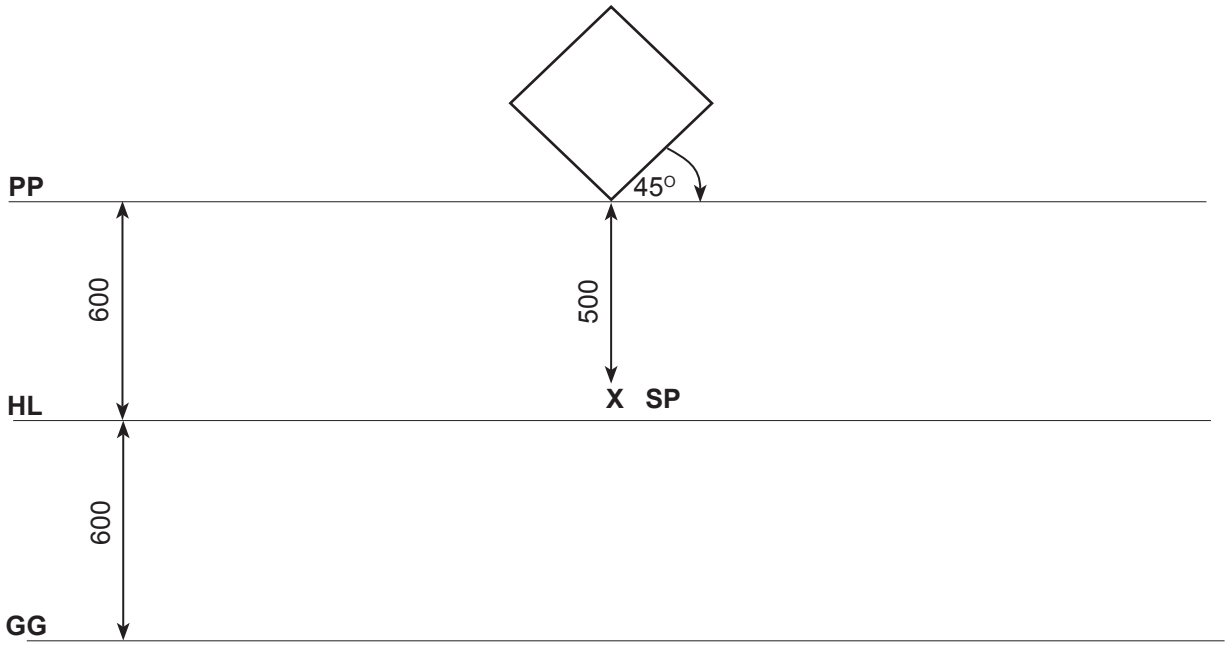

Fig. 13

[12]

[60]

12 Resistant Materials (from page 14 to page 20 of this booklet)

For Examiner's Use

Write your answers in the spaces provided.

(a) Fig. 14 shows a wood bending process in progress.

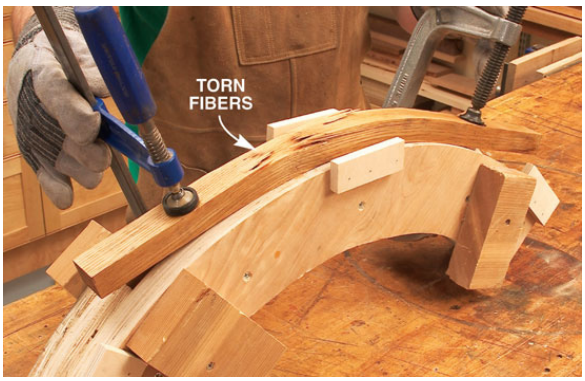

Fig. 14

(i) Name **two** applications for bent wood.

1 .....

.....

2 .....

..... [2]

(ii) Identify **three** methods that are used to soften the wood before it is placed in the mould.

1 .....

2 .....

3 ..... [3]

(iii) All methods identified in **(a)(ii)** have **three** functions in the wood. Describe these functions.

1 .....

.....

2 .....

.....

3 .....

..... [6]

For Examiner's Use

(b) Fig. 15 shows a garden chair.

Fig. 15

(i) After the chair is assembled, it should be prepared for finishing.
Describe how to prepare the surface before varnishing it.

.....

.....

.....

..... [2]

(ii) Explain why it is important to sand along the grain of the wood.

.....

.....

.....

..... [2]

(iii) Certain procedures should be followed when varnish is applied to the wood after the sanding process.
Describe the application of two layers of varnish.

.....

.....

.....

..... [2]

(iv) Oils and varnish both protect wood.
Compare the protection abilities of oil and varnish.

Oil .....

.....

Varnish ....

..... [2]

(v) Give **three** reasons for colouring wood

1 .....

.....

2 .....

.....

3 .....

..... [3]

(vi) Health and safety is important when working with finishes.
List **two** safety measures that must be applied when working with finishes.

1 .....

.....

2 .....

..... [2]

(c) Fig. 16 shows a garden table and bench set.

Fig. 16

(i) The legs of the table are made of mild steel round tubing.
Mild steel is a ferrous metal. Define the term *ferrous metal*.

.....

.....

..... [2]

(ii) Certain properties of mild steel make it suitable to use for the table.
Name **three** properties of mild steel.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(iii) Describe how some steels can be hardened.

.....

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.....

..... [3]

(iv) Give a reason why mild steel cannot be hardened.

.....

..... [1]

(d) Fig. 17 shows the ends and sides of the table as well as the legs of the benches that are made of cast aluminium.

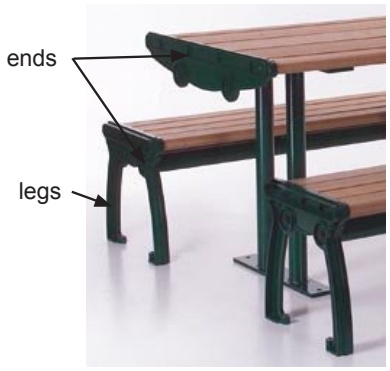

Fig. 17

(i) Aluminium is a non-ferrous metal.

Define the term *non-ferrous metal*.

.....

.....

..... [2]

(ii) The process that was used to cast the ends and the legs of the set is called split pattern sand casting.

Give **three** benefits of split pattern sand casting.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(iii) During the casting process, falling melted metal is dangerous to the person casting.

State **three** safety rules to be applied when casting.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(e) Fig. 18 shows a plastic garden table.

Fig. 18

(i) Plastics are classified into two main types.
Identify the **two** main types.

1 .....

2 ..... [2]

(ii) Compare the differences in the internal structure of the two main types of plastic mentioned in **(e)(i)**.

.....

.....

.....

.....

.....

..... [4]

(iii) Define the term *plastic memory*.

.....

.....

..... [2]

(iv) Name a plastic that could be used to make the table shown in Fig. 18

..... [1]

(v) Classify the plastic you answered in **(e)(iv)** under one of the main types mentioned in **(e)(i)**.

..... [1]

(vi) Fig. 19 shows the injection moulding process in progress.

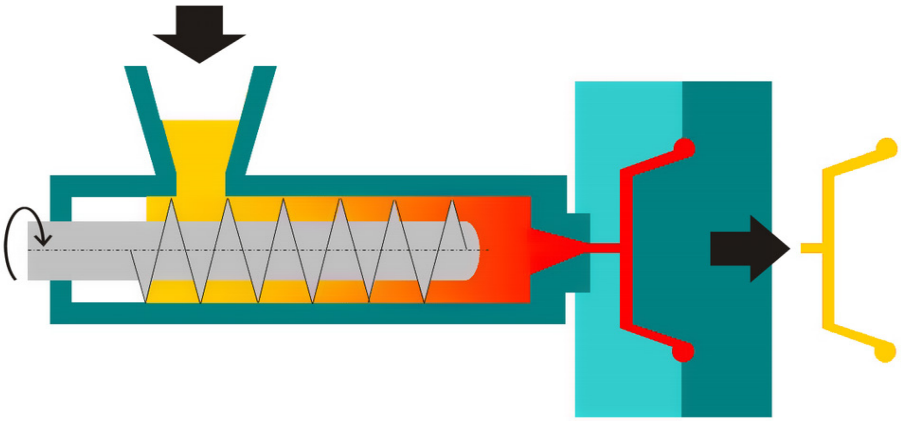

Fig. 19

Briefly describe the process of injection moulding.

.....

.....

.....

.....

.....

..... [4]

(vii) Injection moulding and extrusion moulding are both plastic forming processes.
Compare the working of the screw in **extrusion** and **injection** moulding.

.....

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.....

..... [2]

(viii) After cutting and shaping of plastic, the edges of the plastic will require smoothening.
Describe how the sawn edges of acrylic plastic can be given a smooth finish.

.....

.....

.....

.....

..... [3]

[60]

13 Technology (from page 21 to page 26 of this booklet)

For Examiner's Use

Write your answers in the spaces provided.

(a) Fig. 20 shows two water tanks on a stand. It is called a water tower.

Fig. 20

(i) Name the type of structure of the water tank.

..... [1]

(ii) Name the type of structure of the stand.

..... [1]

(iii) Explain the functions of the **two** types of structure that are used to make up the water tower.

Water tank structure.....

.....

.....

.....

Stand structure.....

.....

.....

..... [4]

(b) Fig. 21 shows a chain and sprocket drive that is used on a road racing bicycle.

For Examiner's Use

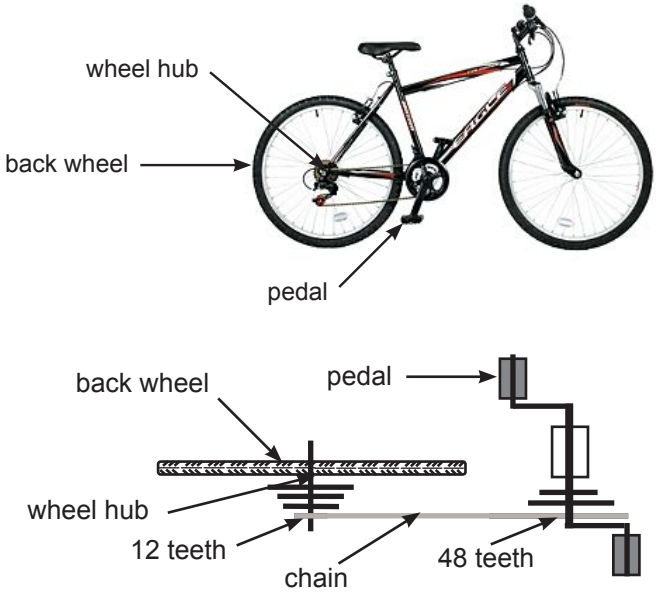

Fig. 21

(i) Calculate the velocity ratio of the sprocket system as shown in Fig. 21.

.....

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.....

.....

..... [4]

(ii) Calculate the rotational speed of the back wheel if the cyclist pedals at 35 rpm.

.....

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.....

.....

..... [4]

(iii) The circumference of the bicycle wheel is 2.5 m.

Calculate the distance travelled in one minute using the rotational speed in **(b)(ii)**.

.....

.....

.....

.....

..... [4]

(iv) The wheel hub runs in plain bearings.

Name the item that could replace the plain bearings in the wheel hub.

..... [1]

(v) Explain how the item named in **(b)(iv)** is used to reduce the friction at the hub of the bicycle.

.....

.....

.....

.....

.....

.....

.....

..... [5]

(vi) Use sketches and notes to show details of the item named in **(b)(iv)**.

[5]

(c) Fig. 22 shows a circuit diagram.

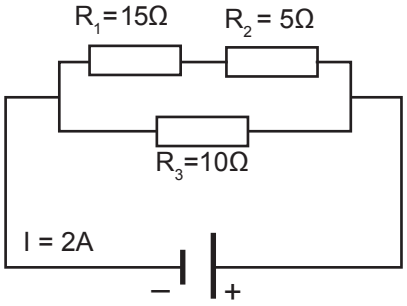

Fig. 22

(i) Calculate the total resistance in the circuit.

.....

.....

.....

.....

.....

..... [4]

(ii) Calculate the supply voltage.

.....

.....

.....

.....

..... [4]

(iii) Use colour coding to show the value of resistor R_1. This resistor has a 5% tolerance.

.....

.....

.....

.....

.....

..... [4]

(d) Fig. 23 shows a light activated switch circuit.

For Examiner's Use

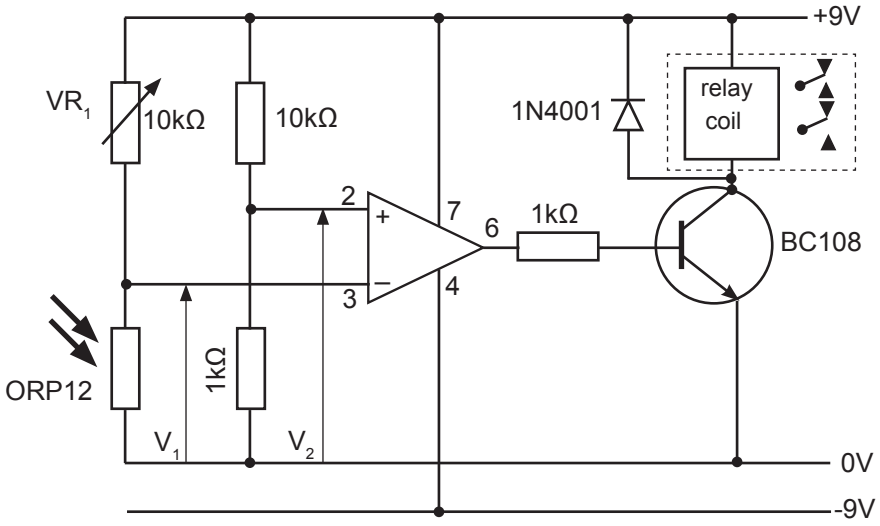

Fig. 23

(i) Name the type of transistor used in this circuit.

..... [1]

(ii) Describe the operation of the circuit in Fig. 23.

.....

.....

.....

.....

.....

.....

..... [5]

(iii) Name item 1N4001 in Fig. 23.

..... [1]

(iv) Explain the function of item 1N4001.

.....

.....

.....

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.....

.....

..... [4]

For Examiner's Use

(e) Fig. 24 shows a de-bounce flip-flop circuit using 4 NAND gates.

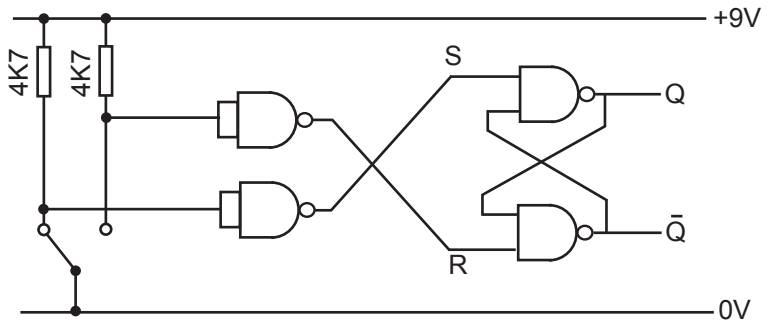

Fig. 24

(i) Discuss the uses of the de-bounce flip-flop circuit shown in Fig. 24.

.....

.....

.....

.....

.....

..... [4]

(ii) Complete the following truth table for the circuit in Fig. 24.

	Input		Output	
Comment	R	S	Q	$\bar{Q}$
Start up state	0	0	1/0	0/1
Set switch pushed	0	⊓		
Reset switch pushed	⊓	0		1
Disallowed state	1	1	0	

[4]

[60]

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